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NOTES ON AMERICAN LYCOSIDAE

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In spite of the fact that the wolf spiders or Lycosidae have always received a generous portion of the attention and interest of arachnologists, it was not until the publication of Chamberlin's 'Revision of the North American Spiders of the Family Lycosidae' in 1908 that anything resembling nomenclatorial stability was attained for the Nearctic species. In that fine monograph all the Hentzian names are established with some certainty, and valuable concepts, previously outlined, in the use of genitalia as a generic index, are utilized in the definition of genera. The total number of valid species considered in the paper was less than seventy. Recent collections have added enormously to the number of forms endemic to this region. At least twice as many are now known from the Nearctic region as were considered in the revision of 1908, and it would be fully within the limits of conservatism to expect triple the number there described.

Opinion is still diverse as regards the use of certain specific names in the Nearctic Lycosidae. The founding by Walckenaer of a large number of species of American spiders on the colored drawings of John Abbot has decidedly impaired the normal development of a stable specific nomenclature. Some workers have argued that these names are invalid and have accepted them only when it was certain that specimens were actually on hand at the time Walckenaer wrote his descriptions. Such an opinion is untenable. The problem at hand is not the question of validity, which should be unchallenged, but one of recognition. Of the few names that have been placed, it can be said that they are used without any great amount of certainty. Fortunately, the Abbot Manuscript and drawings are still extant, and a study by students well versed in certain groups will ultimately solve the problem.

No general agreement has yet been reached in the controversy over the identity of the genotype of *Lycosa*. The name was first used in a generic sense by Latreille in 1804, and six years later, in 1810, he designated *Lycosa tarentula* as the type. There has been an overwhelming adherence to this concept by numerous European and American workers, notably Simon. On the other hand, it is held that the designation of this

species as type cannot be maintained, even when so used subsequently by the original author of the genus, because *tarentula* was not included in the group for which *Lycosa* was originally proposed. *Lycosa lugubris* was designated as type by Thorell in 1870. Its recognition would invalidate many names now used in both *Lycosa* and *Pardosa* and the latter would become a synonym. While I am sentimentally inclined to favor *tarentula* as the type, I should say that in my opinion the other side has much the better of the argument. However, in this paper the conventional American viewpoint is adhered to and *Pardosa* is used for the small species.

In this short paper an attempt has been made to place some of our species in what is regarded as their proper generic categories. The genus *Arctosa* is considered in its entirety and a key to the Nearctic forms is given. All of the species known from this region that conform to the genus *Tarentula* (*Alopecosa* Simon) are listed. In the other genera mentioned synonymical changes have been made in numerous instances, some of the sunken species are elevated to specific rank, and in addition important distributional data are recorded. *Pirata* is unquestionably the least known of the American genera. Some of the changes suggested in the nomenclature of this genus are opinional, but the disposition of other names is based on the careful comparison of the types.

At this point it is of some importance to note that the lycosid types of Montgomery, with the exception of some of his species based on the Stone collection, are deposited in the collection of The American Museum of Natural History. A study of this material is directly responsible for some of the changes. Fortified with a large collection of European Lycosidae, acquired in exchange through the coöperation of Dr. E. Schenkel of Switzerland, I have been able to check the suggested synonymy of American forms by Emerton and Chamberlin. At least eight species are common to the Nearctic and Palearctic regions.

The genus *Allocosa* Banks, with *A. funerea* (Hentz) as the type, cannot be maintained separate from *Arctosa*. The genotype is the most divergent member of the group, but all intergrades between *A. funerea* and *A. littoralis* are known from the United States. The dark, shining carapace of *funerea* can be matched in such forms as *A. rubicunda* (Keyserling) and *A. sublata* (Montgomery). The reduction of the spines on the legs above is quite as true for species referred to *Allocosa* as in the other genus, the first two pairs being usually unarmed above and the last two with at most a single submedian spine above. The epigyna agree in lacking completely or in having a very weakly developed guide.

The palpi are even more significant as an index of relationship and such superficially different species as *funerea* and *littoralis* present similarities in structure that can scarcely be denied. In fact, on this basis such species as *Arctosa rubicunda*, *emertoni* and *quinaria*, not taking into consideration the substantial differences in the eye relations, are more remote from *cinerea* than is *funerea*. It is significant that F. O. P. Cambridge used *Arctosa* for species that were later relegated to *Allocosa*.

Of the fifteen species considered as belonging in *Arctosa* in this paper, only one is found in the Palearctic region. A comparison of four European species, including the genotype, further substantiates Chamberlin's separation of *littoralis* from *cinerea* and verifies Emerton's synonymizing of *Lycosa albohastata* with *Arctosa alpigena* (Doleschal). In addition to the inclusion in the genus of forms described in other groups, some species are regarded as new, and several changes in the conventional synonymy are made, notably the elevation of *sublata* and *noctuabunda* Montgomery to specific rank and the sinking of *rugosa* Keyserling as a synonym of *funerea*.

ARCTOSA C. Koch

C. KOCH, 1848, 'Die Arachniden,' XIV, p. 94. Type: *A. cinerea* (Fabricius).
Synonym: *Allocosa* Banks.

Allocosa N. BANKS, 1904, Proceedings Academy of Natural Sciences, Philadelphia, p. 537. Type: *A. funerea* (Hentz).

KEY TO THE NEARCTIC SPECIES OF *Arctosa*

- 1.—Second row of eyes much narrower than the first row. 2.
Second row of eyes about as broad or broader than the first row. 5.
- 2.—Legs distinctly annulate. *emertoni*, new species.
Legs light brown or black, without annulae. 3.
- 3.—Eyes of second row separated by nearly their diameter; legs and carapace black;
tibia and patella IV as long as carapace. *quinaria* (Emerton).
Eyes of second row separated by less than half their diameter. 4.
- 4.—Carapace dark brown to black, with no lighter markings; tibia and patella IV
shorter than carapace. *rubicunda* (Keyserling).
Carapace with light markings; tibia and patella IV about as long as carapace.
imperiosa Gertsch.
- 5.—Carapace usually glabrous, shining, light to very dark brown, without light
markings. 6.
Carapace with lighter markings on the mid line or on the margins of
the carapace. 11.
- 6.—First two femora black, the remainder of these legs light, not annulate.
funerea (Hentz).
First two femora usually annulate, but when dusky, the rest of the legs annulate
or concolorous with the femora. 7.

- 7.—Males.....8.
Females.....9.
- 8.—Principal scopal process a slender, straight spur, directed ventrally; all legs annulate.....*chamberlini*, new species.
Principal scopal process a moderately stout, curved apophysis; first legs not annulate.....*mulaiki*, new species.
- 9.—Epigynal plate strongly rounded behind, the atriobursal orifices visible as two dark cavities on the surface of the plate.....*virgo* (Chamberlin).
Epigynal plate at most weakly rounded behind, the atriobursal orifices hidden by the caudal margin.....10.
- 10.—Caudal margin of epigynal plate straight; color of carapace dusky or black, shining.....*sublata* (Montgomery).
Caudal margin of epigynal plate gently rounded; carapace dark reddish-brown.
mulaiki, new species.
- 11.—Males.....12.
Females.....16.
- 12.—Bulb with a prominent, sclerotized distal apophysis.....13.
Bulb lacking a distal apophysis; scopus assymmetrically bifid.
alpigena (Doleschal).
- 13.—Tibial joint of palpus nearly as long as the tarsus; size over 12 mm.; tibia and patella IV longer than carapace.....*littoralis* (Hentz).
Tibial joint of palpus no more than two-thirds as long as the tarsus; size usually less than 9 mm.; tibia and patella IV about as long as the carapace.....14.
- 14.—Principal scopal element broad, folded.....*parva* (Banks).
Principal scopal element a long, curved process.....15.
- 15.—Distal bulbal apophysis short, laterally directed...*noctuabunda* (Montgomery).
Distal bulbal apophysis long, caudally directed to touch the scopus.
mokiensis, new species.
- 16.—Epigynal plate with broad openings separated by a weakly indicated guide.
littoralis (Hentz).
Epigynal plate without openings on the plate proper, the atriobursal orifices at the caudal margin.....17.
- 17.—Caudal margin of epigynal plate bilobate.....*parva* (Banks).
Caudal margin nearly straight.....18.
- 18.—Tibia and patella IV slightly shorter than the carapace, which is moderately hairy; sternum black.....*alpigena* (Doleschal).
Tibia and patella IV as long as the carapace, which is nearly glabrous; sternum light.....*noctuabunda* (Montgomery).

***Arctosa alpigena* (Doleschal)**

- Trochosa insignita* THORELL, 1872, Ofvers. K. Vet. Akad. Forh., XXIX, p. 160.
Lycosa albohastata EMERTON, 1894, Trans. Connecticut Academy Arts and Sciences, IX, p. 423, Pl. III, fig. 3.
Lycosa albohastata CHAMBERLIN, 1908, Proc. Acad. Nat. Sci. Philadelphia, p. 275, Pl. XIX, fig. 1.
Lycosa alpigena EMERTON, 1921, Psyche, XXVIII, p. 168.

RECORDS.—Nain, Labrador, July 3, 1922. Yellowstone National Park, August, 1931 (W. E. Gertsch). Sharon, Idaho, August 17, 1931 (Gertsch). Albuquerque, New Mexico. Hudson Bay, Great Whale River to Richmond Gulf, August, 1920 (Johansen). Lac Seul, Ontario (Waugh). Southern Labrador, Macativa to Sandy Islands, July, 1915 (Townsend). President Mountain, 8000 feet, near Alpine Club Camp, Alberta, August, 1914 (Emerton). North Devon Island, Hudson Bay, August 13, 1904. Spring Lake, Hudson Bay, July 10, 1917.

***Arctosa quinaría* (Emerton)**

Lycosa quinaría EMERTON, 1894, Trans. Connecticut Academy Arts and Sciences, IX, p. 422, Pl. III, fig. 5.

Lycosa quinaría CHAMBERLIN, 1908, Proc. Acad. Nat. Sci. Philadelphia, p. 277, Pl. XIX, fig. 7.

RECORDS.—Edmonton, Alberta.

***Arctosa imperiosa* Gertsch**

Arctosa imperiosa GERTSCH, 1933, American Museum Novitates, No. 637, pp. 13–14, Fig. 17

RECORDS.—Colorado Springs, Colorado, July (type locality). Pikes Peak, Colorado (Cockerell). Ouray, Colorado (Lutz).

***Arctosa rubicunda* (Keyserling)**

Trochosa rubicunda KEYSERLING, 1876, Verh. Zool.-Bot., Gesell. Wien, XXVI, p. 663, Pl. II, fig. 40.

Lycosa polita EMERTON, 1885, Trans. Connecticut Academy Arts and Sciences, VI, p. 484, Pl. XLVI, fig. 2 (not "spotted form").

Lycosa rubicunda CHAMBERLIN, 1908, Proc. Acad. Nat. Sci. Philadelphia, p. 278, Pl. XIX, fig. 9 (part).

RECORDS.—Norwalk, Connecticut, July 20–28, 1933; May 25–27, 1933 (Gertsch).

***Arctosa emertoni*, new species**

Lycosa polita EMERTON, 1885, Trans. Connecticut Academy Arts and Sciences, VI, p. 484, Pl. XLVI, fig. 2a (variety with spots).

MALE.—Total length, 7.66 mm. Carapace 4.10 mm. long, 3.00 mm. wide, 1.70 in front. Abdomen 3.66 mm. long, 2.42 mm. wide.

Cephalothorax provided with a very sparse covering of short hairs and weak spines, the eye area being comparatively heavily clothed with white hairs. Clypeal margin with four long spines. Integument of the carapace bright yellowish-brown, the eyes on a black field, medially with a light band at each side of which is a broad dusky band that extends to the caudal margin and includes the sides of the pars cephalica.

Margins of the carapace with a broken, narrow dark band. Mouth parts, sternum and coxae light yellowish-brown, concolorous with the integument of the legs, which are distinctly annulate, the rings usually broken below and sometimes above. Abdomen dark above, showing no pattern, the venter somewhat lighter.

First row of eyes broader than the second (33/26), the medians slightly larger, two-thirds of a diameter apart, half as far from the laterals. Clypeus as wide as two-thirds the diameter of an anterior median eye, which is the same distance from the eye of the second row. Eyes of the first row very slightly recurved, as seen from in front, more so as viewed from above. Eyes of the second row larger than the anterior medians (10/8), separated by their diameter, slightly farther from the eyes of the third row, which are smaller (10/8). Third eye row narrower than the second (26/43), the eyes separated by three diameters. Chelicerae armed with three subequal teeth on the lower margin, and three on the upper, of which the middle one is larger.

Legs stout, the first tibiae with 2-2-2 spines beneath, the second with 1-2-2, the metatarsi with three pairs of strong spines. First two tibiae unarmed above, the last two with a stout median spine and either a basal bristle or a very weak spine.

Tibia and patella I, 4.80 mm. long.

Tibia and patella IV, 5.33 mm. long.

Palpus very close to that of *Arctosa rubicunda* (Keyserling), the differences being chiefly in the scopus, which is a short straight black spur in *rubicunda* but strongly curved in *emertoni*.

FEMALE.—Total length, 11.30 mm. Carapace 5.00 mm. long, 3.90 mm. wide, 1.80 mm. in front. Abdomen 7.00 mm. long, 4.66 mm. wide.

Color, structure, eye relations and spines as in the male.

Tibia and patella I, 4.00 mm. long.

Tibia and patella IV, 4.43 mm. long.

Epigynum indistinguishable from that of *Lycosa polita* as figured by Emerton.

TYPE LOCALITY.—Male holotype, female allotype, and male and female paratypes from Wacouta Beach, Lake Pepin, Minnesota, May 15, 1932 (Gertsch); male and female paratypes from St. Thomas, Ontario (L. E. James).

The species described by Keyserling is the one in which the dark carapace is smooth and shining, entirely devoid of hairs or spines. Emerton's types are of both species: one which was described in more detail as "without spots," from Blue Hills, Boston, Massachusetts, I regard as the type and a synonym of *rubicunda*; and the other is the variety "with spots," from Albany, New York. Both have been regarded as identical by subsequent writers, but a comparison shows they are specifically distinct. I have males and females of the dark variety from Norwalk, Connecticut, taken from May to August.

ADDITIONAL RECORDS.—Lanoraie, Quebec, June 24, 1915 (Beaulne). Montreal, Quebec, May 8, 1915 (Beaulne). Hudson, Quebec, May 21, 1915 (Beaulne). Awene, Manitoba, October 16, 1917 (Criddle). Ottawa, Ontario, April 28, 1912 (Beaulne).

***Arctosa littoralis* (Hentz)**

Lycosa littoralis HENTZ, 1844, Journ. Boston Soc. Natural History, IV, p. 388, Pl. xvii, fig. 9.

Lycosa cinerea CHAMBERLIN, 1908, Proc. Acad. Nat. Sci. Philadelphia, p. 281, Pl. xx, figs. 5 and 6.

Arctosa littoralis CHAMBERLIN, 1924, Proc. California Academy Sciences, (4) XII, pp. 673-674.

This widely distributed species is found from coast to coast and from Mexico far north into Canada. I have found it running freely along the margins of rivers and lakes in Minnesota in company with *Arctosa emertoni*. Under suitable conditions it digs a burrow ten inches or more in depth, the ones that I have seen being in soft sand along the Mississippi River near Minneapolis, Minnesota. The following cited localities will give some idea of its general occurrence in the Nearctic region.

RECORDS.—Los Angeles, California. Chisos Pass, Brewster County, Texas (Montgomery). Austin, Texas (Montgomery). Grand Gulch, Utah. Utah Lake, Utah, July. Palilo Beach, Florida, March 4. Lake Pepin, Minnesota, May 15, 1932 (Gertsch). Lake Minnetonka, Minnesota, June 2, 1932 (Gertsch). Cold Spring Harbor, Long Island, New York (Montgomery). Woods Hole, Massachusetts. Canada. Arnprior, Ontario. Lac Seul, Ontario, August 1, 1919 (Waugh). Lanoraie, Quebec, July 5, 1915, June 25, 1915 (Beaulne). Ironside, Quebec, October 21, 1915 (Stohr).

***Arctosa sublata* (Montgomery)**

Lycosa sublata MONTGOMERY, 1902, Proc. Acad. Nat. Sci. Philadelphia, p. 539, Pl. xxix, fig. 2.

Allocosa funerea CHAMBERLIN, 1908, Proc. Acad. Nat. Sci. Philadelphia, p. 287, Pl. x, fig. 3 (error in synonymy).

RECORDS.—Kingston, Tennessee, July 10-12, 1933 (Gertsch).

***Arctosa virgo* (Chamberlin)**

Allocosa virgo CHAMBERLIN, 1925, Bulletin Museum of Comparative Zoölogy, LXVII, p. 226.

RECORDS.—Baltimore, Maryland. Rockbridge, Ohio, June 17, 1922 (Barrows).

***Arctosa noctuabunda* (Montgomery)**

Trochosa noctuabunda MONTGOMERY, 1904, Proc. Acad. Nat. Sci. Philadelphia, p. 301, Pl. xviii, figs. 9 and 10.

Allocosa degesta CHAMBERLIN, 1904, Canadian Entomologist, XXXVI, p. 287.

Allocosa degesta CHAMBERLIN, 1908, Proc. Acad. Nat. Sci. Philadelphia, p. 288, Pl. x, figs. 1 and 2.

Allocosa pylora CHAMBERLIN, 1925, Bulletin Museum of Comparative Zoölogy, LXVII, p. 226.

RECORDS.—Austin, Texas (Montgomery). Llano County, Texas (Montgomery). Florida.

***Arctosa mokiensis*, new species**

Arctosa noctuabunda GERTSCH, 1933, American Museum Novitates, No. 637, p. 8, fig. 11 (not *noctuabunda* Montgomery).

MALE.—Total length, 3.80 mm. Carapace 2.66 mm. long, 2.06 mm. wide, .93 mm. in front. Abdomen 2.26 mm. long, 1.60 mm. wide.

Cephalothorax clothed with a few short hairs and spines, the eye area with black hairs and four long spines on the clypeal margin and an additional one between the anterior median eyes. Carapace light brown in color, lightest at the middle, somewhat infuscated on the sides. Sternum, labium, endites and coxae light yellowish-brown, all clothed with black hairs and a few spines. Legs concolorous with the coxae, the last pair of legs with inconspicuous annulae on the femora. Abdomen light, showing no pattern.

First eye row narrower than the second (20/23), the slightly larger median eyes separated by two-thirds of a diameter, half as far from the laterals. Second row of eyes narrower than the third (23/29), the eyes two-thirds of a diameter apart, larger than the anterior medians (9/4), larger than the eyes of the last row (9/6.5) and about twice as far away from them. Posterior ocular quadrangle broader than long (29/23), narrower in front in the same ratio. Clypeus equal in height to two-thirds the diameter of an anterior median eye. Chelicerae with three teeth on the lower margin.

Legs moderately stout, the first and last tibiae with 2-2-2, the second and third with 1-2-2 spines beneath, the metatarsi with three pairs. Tibiae of the first two pairs of legs lacking spines above, the last two with a submedian spine.

Tibia and patella I, 3.00 mm.

Tibia and patella IV, 3.80 mm.

Palpus very close to others in the *Allocosa* group and separable from that of *Arctosa noctuabunda* (Montgomery) by characters of the median apophyses of the bulb. The principal scopal element is identical in both species, a heavy ventrally curved spine, but the processes beneath the scopus are different. In *noctuabunda* the inferior scopal element is a heavy, short tooth. The homologous structure in *Arctosa mokiensis* is a slender, long spine. The distal apophysis of the bulb is very similar in these two species as well as in others of the group [*funerea* (Hentz), *apora*, new species, *parva* (Banks), etc.] but the caudally projecting spur is much longer in *mokiensis* than in any of the other species.

TYPE LOCALITY.—Male holotype from Indian Gardens, Grand Canyon, Arizona, May 26, 1905.

***Arctosa apora*, new species**

MALE.—Total length, 5.25 mm.

Carapace 2.75 mm. long, 2.00 mm. wide, 1.10 mm. in front. Abdomen 2.70 mm. long, 1.62 mm. wide.

Cephalothorax smooth and shining, the eye area well provided with erect spines and short hairs, the clypeal margin with five prominent spines. Labium, endites, sternum and coxae dull yellowish-brown, concolorous with the legs, which are indistinctly annulate. Abdomen bright yellow above, the sides dark, the venter lighter.

First row of eyes narrower than the second (21/25), very weakly procurved, the larger medians separated by one-half their diameter, half as far from the laterals. Clypeus about as high as the diameter of an anterior lateral eye. Second row of eyes narrower than the third (25/29), separated by three-fourths of a diameter, slightly over a diameter from the smaller posterior eyes (10/7). Posterior ocular quadrangle broader than long (29/22), slightly narrower in front, the posterior medians separated by a little more than two diameters. Chelicerae with three teeth on the lower margin, the inner one minute.

Legs stout, the spines as in *chamberlini*, new species.

Tibia and patella I, 2.35 mm. long.

Tibia and patella IV, 2.80 mm. long.

Palpus of the *Allocosa* type, differing from all other species in the modification of the cymbium. In the typical members of the genus the cymbial margins are rounded, but in *apora* the retrolateral basal margin is expanded into a lobe that projects ventrally and partially covers the scopal elements. The principal spur of the scopus, long in the other species, is reduced to a short spine and is exceeded in length by the inferior apophysis. The distal bulbal apophysis is elongated as in *mokiensis*.

Two females from the same collection may belong with the above described male, but they are identical in every respect, including the bilobate epigynum, with *Arctosa parva* (Banks).

TYPE LOCALITY.—Male holotype from San Jose, Costa Rica.

Arctosa parva (Banks)

Trochosa parva BANKS, 1894, Journal New York Entomological Society, II, p. 52.

Arctosa parva F. CAMBRIDGE, 1902, 'Biologia Centrali-Americana,' Arachnida, Araneidea, II, p. 332.

Allocosa parva CHAMBERLIN, 1908, Proc. Acad. Nat. Sci. Philadelphia, p. 289, Pl. xx, fig. 7.

RECORDS.—San Francisco, California. Las Vegas, Nevada.

Arctosa funerea (Hentz)

Lycosa funerea HENTZ, 1844, Journal Boston Soc. Natural History, IV, p. 393, Pl. xviii, fig. 11.

Lycosa rugosa KEYSERLING, 1876, Verh. Zool.-Bot., Gesell. Wien, XXVI, p. 624, Pl. I, figs. 9 and 10.

Pardosa nigra STONE, 1890, Proc. Acad. Nat. Sci. Philadelphia, p. 432, Pl. xv, fig. 4.

Allocosa funerea CHAMBERLIN, 1908, Proc. Acad. Nat. Sci. Philadelphia, p. 287, Pl. x, fig. 3.

RECORDS.—Kingston, Tennessee, July 10–15, 1933, "common under stones" (Gertsch and Ivie).

***Arctosa mulaiki*, new species**

MALE.—Total length, 4.60 mm. Carapace 2.72 mm. long, 1.92 mm. wide, 1.00 mm. in front. Abdomen 2.00 mm. long, 1.50 mm. wide.

Cephalothorax smooth and shining, devoid of hairs or spines except on the clypeal margin, dark reddish-brown in color, the eye area black. Margin of the pars thoracica with a narrow black line. Sternum light yellowish-brown, medially with a light streak, clothed sparsely with black hairs on the margins. Labium light brown, the endites lightened distally. The first two pairs of legs light yellowish-brown, without annulae, the femora dusky. Last two pairs of legs with basal and distal black annulae on the tibiae, the femora infuscated, the distal joints light brown. Abdomen dark on the sides, the dorsum with a medial basal orange, hastate marking, followed by broken black chevrons, the venter paler.

First row of eyes as wide as the second, the eyes subequal, the medians separated by two-thirds of a diameter, half as far from the laterals. Clypeus three-fourths as high as the diameter of an anterior lateral eye. Eyes of the second row separated by two-thirds of a diameter, twice as far from the eyes of the third row, which are separated from each other by about two and one-half diameters. Chelicerae with three teeth on the upper and three on the lower margin of the furrow.

Legs stout, all the tibiae and metatarsi with three pairs of spines beneath, the last two tibiae armed above with a submedian spine, the first two without spines.

Tibia and patella I, 2.25 mm. long.

Tibia and patella IV, 2.62 mm. long.

Palpus identical in structure with that of *Arctosa noctuabunda* (Montgomery).

FEMALE.—Total length, 6.20 mm. Carapace 2.75 mm. long, 2.08 mm. wide, 1.32 mm. in front. Abdomen 3.45 mm. long, 3.00 mm. wide.

Coloration as in the male, except for the legs, which are darker and show traces of annulae on the tibiae of the first two pairs. Eyes arranged as in the male, the first row about equal to the second in width, the third row broader (27/21). The epigynum is very close to that of *A. noctuabunda*, the principal difference being in the gently rounded caudal margin, which is straight in the other species.

Female holotype, and male allotype from Edinburgh, Texas, collected by Mr. Stanley Mulaik for whom the species is named.

Arctosa mulaiki is distinguished from the closely allied *A. noctuabunda* by the following characters. The carapace is much more convex, proportionately shorter, the head broader, and in addition lacks the lighter dorsal and marginal markings always present in the other species. In the male of this new form the first legs are unbanded and the tibia and patella of the fourth pair is slightly shorter than the carapace, slightly longer in *noctuabunda*.

***Arctosa chamberlini*, new species**

MALE.—Total length, 4.33 mm. Carapace 2.06 mm. long, 1.50 mm. wide, .70 mm. in front. Abdomen 2.16 mm. long, 1.46 mm. wide.

Cephalothorax smooth and shining, utterly devoid of spines or hairs except on the margins, the clypeus with four stout spines. Carapace black, lightened slightly

above, behind the last row of eyes. Sternum and labium black, the endites, coxae and legs bright yellowish brown. Legs and underparts of the cephalothorax clothed very sparsely with black hairs. Legs with a median and distal ring on the femora and a sub-basal and distal dark ring on the tibiae and metatarsi, otherwise unmarked. Abdomen light brown above and below, the sides darker, the venter with a few dark spots.

First row of eyes narrower than the second ($13/16$), slightly procurved, the medians considerably larger, separated by two-thirds their diameter, half as far from the laterals. Eyes of the second row larger than the anterior medians ($7/3$), separated by five-sevenths of a diameter, twice as far from the eyes of the last row, which are a little more than three diameters apart. Posterior ocular quadrangle broader than long ($20/17$), slightly narrowed in front in the same ratio. Clypeus equal in height to the diameter of an anterior lateral eye. Chelicerae armed above and below with three teeth, the middle one of which is larger.

Legs stout, the first tibiae with 2-2-2 spines, the second with 1-2-2 beneath, the metatarsi with three pairs. First two tibiae without spines above, the last two with a single median spine.

Tibia and patella I, 1.60 mm. long.

Tibia and patella IV, 2.00 mm. long.

Palpus of the *Allocosa* type, closely related to *funerea* (Hentz), *noctuabunda* (Montgomery) and *parva* (Banks). The scopal element is divided into two parts as in *parva* but the principal one is not as large or bent so strongly caudad as in that species. In the other species mentioned this process is considerably larger and curved strongly ventrad. The annulate femora immediately separate this new species from *funerea* in which the femora are always black and the distal joints of the anterior legs are light.

TYPE LOCALITY.—Male holotype from Vernal, Utah, November 20, 1930 (O. H. Robinson, collector).

***Arctosa floridiana* (Banks)**

Trochosa floridiana BANKS, 1893, Trans. American Entomological Society, XXIII, p. 72.

Lycosa floridiana CHAMBERLIN, 1908, Proc. Acad. Nat. Sci. Philadelphia, p. 283 (not *Lycosa floridana* Banks).

Arctosa seminola PETRUNKEVITCH, 1911, Bulletin American Museum Natural History, XXIX, p. 552.

This species is not included in the key. The types are females and are well-marked examples of the genus *Arctosa*.

PIRATA Sundevall

GENOTYPE.—*Pirata piraticus* (Clerck).

***Pirata arenicola* Emerton**

Pirata aspirans CHAMBERLIN, 1908, Proc. Acad. Nat. Sci. Philadelphia, p. 303, Pl. XXII, fig. 5. (male, not female type).

Pirata arenicola EMERTON, 1909, Trans. Connecticut Academy Arts and Sciences, XIV, pp. 208-209, Pl. VI, fig. 9.

Pirata maculatus EMERTON, 1909, idem, p. 209, Pl. VI, fig. 10.

Pirata insularis Emerton

Pirata insularis EMERTON, 1885, Trans. Connecticut Academy Arts and Sciences, VI, p. 492, Pl. XLVIII, fig. 8.

Pirata liber MONTGOMERY, 1902, Proc. Acad. Nat. Sci. Philadelphia, p. 578, Pl. XXX, figs. 42 and 43.

Pirata insularis CHAMBERLIN, 1908, idem, p. 309, Pl. XXII, figs. 3 and 4 (male, not female).

Pirata sylvestris EMERTON, 1909, Trans. Connecticut Academy Arts and Sciences, XIV, p. 209, Pl. VI, fig. 8 (male, not female).

Pardosa bilobata Tullgren and *Pirata montanoides* Banks are probably properly placed as a synonyms of this species.

Pirata minutus Emerton

Pirata minutus EMERTON, 1885, Trans. Connecticut Academy Arts and Sciences, VI, p. 493, Pl. XLVIII, fig. 10.

Pirata exiguus BANKS, 1892, Proc. Acad. Nat. Sci. Philadelphia, p. 72, Pl. I, fig. 48.

Pirata humicola MONTGOMERY, 1902, idem, p. 575, Pl. XXX, figs. 40 and 41.

Pirata prodigiosa Keyserling

Pirata prodigiosa KEYSERLING, 1876, Verh. Zool.-Bot., Gesell. Wien, XXVI, p. 669, Pl. II, fig. 44.

Lycosa febriculosa BECKER, 1881, Comptes-Rendus Soc. Entom. Belgique, p. XLV, Pl. II, fig. 2.

Lycosa wacondana SCHEFFER, 1904, Entomological News, Philadelphia, XV, p. 260, Pl. XVII, fig. 7.

Pirata sylvestris EMERTON, 1909, Trans. Connecticut Academy Arts and Sciences, XIV, p. 209, Pl. VI, fig. 8. (Female ?)

Pirata sedentarius Montgomery

Pirata sedentarius MONTGOMERY, 1904, Proc. Acad. Nat. Sci. Philadelphia, p. 312, Pl. XIX, figs. 28 and 29.

This species is distinct from *P. febriculosa*, with which it has been synonymized. It is a very common species in Tennessee and Texas.

Pirata gigantea, new species

FEMALE.—Total length, 5.30 mm. Carapace 3.00 mm. long, 2.12 mm. wide, 1.20 mm. in front. Abdomen 2.66 mm. long, 1.66 mm. wide.

Cephalothorax sparsely clad with short black hairs, the black eye region with numerous long, weak spines. Integument of the carapace yellowish brown, with two broad longitudinal brown bands, between which is a median lighter band and forward in the eye region the customary *Pirata* light markings. Sides of the carapace with a broad, irregular, marginal light band. Sternum and mouth parts infuscated, little darker than the unmarked legs, which are clothed with black hairs and strong spines. Abdomen dark above, with a median basal lighter marking, the venter lighter.

Eyes of the first row slightly narrower than the second (23/27), straight, the medians two-thirds of a diameter apart, slightly nearer the smaller laterals. Second row much narrower than the third (27/38), the eyes separated by seven-tenths of a diameter, a diameter from the smaller eyes of the third row. Posterior ocular quadrangle much broader than long (23/38). Clypeus scarcely as high as the diameter of an anterior lateral eye. Chelicerae with three teeth on the lower margin.

Legs long, provided with strong spines, the first tibia with 2-2-0 beneath, the distals missing, the pair often regarded as ventral are here considered as lateral, the other tibiae with 2-2-2 beneath. Tibiae of the first two legs lacking true spines above, a basal and submedian bristle often present, the last two pairs with a true basal and a submedian spine above.

Tibia and patella I, 3.00 mm.

Tibia and patella IV, 3.70 mm.

Epigynum scarcely half as broad as the sternum, a conspicuous black plate somewhat broader than long, broadly rounded caudally and with a median groove dividing it into two equal lobes as in *P. insularis* Emerton. Between the lobes are two rounded tubercles, separated by scarcely a diameter. In *P. insularis* the homologous structures are nearer the caudal margin and are widely separated. That species further differs in having a marginal black band on the carapace.

TYPE LOCALITY.—Female holotype and paratypes from near Chicago, Illinois, June 13.

The generic name *Tarentula* should be used for the species referred to *Alopecosa* by some American authors. At least six species conform to the definition of that genus and are in full agreement with those referred to it by Reimoser in his 'Katalog der Echten Spinnen des Paläarktischen Gebietes' (Abhandlungen der Zool.-Bot., Gesellschaft in Wien, Band X, heft 2 (1919)). In addition to the more important differences in the genitalia demarking this group from other genera, the species may be recognized by their having two teeth, rather than the conventional three, on the lower margin of the cheliceral furrow. A single American species, *Trochosa pratensis*, other than those commonly referred to *Alopecosa*, has the same armature, but it can scarcely be confused with the other group. *Lycosa beani* Emerton is identical with *Tarentula aculeata* of Europe. Of the nine Siberian members of *Tarentula*, described by Kulczynski in 1908, one is reported with some degree of certainty as belonging to the Nearctic fauna. It is to be expected that many more will be found to be common to both areas.

TARENTULA Sundevall

Tarentula aculeata (Clerck)

Aranea aculeata CLERCK, 1757, 'Aranei Suecici,' Stockholm.

Lycosa beani EMERTON, 1894, Trans. Connecticut Academy Arts and Sciences, IX, p. 421.

DISTRIBUTION.—Europe, Siberia, and northern North America.

RECORDS.—Minneapolis, Minnesota, May, 1932 (Gertsch). Itasca Park, Minnesota, May 29–30, 1932 (Gertsch). Medicine Hat, Alberta, August 16, 1930. Saskatoon, Saskatchewan. Banff, Alberta, June, 1919 (Sanson). Lac Seul, Ontario, 1919 (Waugh). Lake of the Woods, August 19, 1924 (Waugh). Isle Haute, N.S., 1921 (Townsend). Long Peak, Colorado. Yellowstone National Park, Wyoming, August, 1930 (W. E. Gertsch).

***Tarentula asivak* (Emerton)**

Lycosa asivak EMERTON, 1919, 'Canadian Arctic Expedition of 1913–1918, III, Insecta, part H, pp. 5H–6H, Pl. II, figs. 13–16.

RECORDS.—Bernard Harbor, N. W. T., July 12, 1915, August 17, 1915, May 3, 1916, May 21, 1916 (Johansen). Young Point, N. W. T., July 18, 1916 (Johansen). Lake Harbor, Baffin Land, August 23, 1927 (Johansen). Cape Barrow, Arctic Canada, August 14. West of Kongengevik, Camden Bay, July 4, 1914 (Johansen).

***Tarentula exasperans* Cambridge**

Tarentula exasperans CAMBRIDGE, 1877, Annals and Magazine of Natural History, London, (4) XX, p. 283, Pl. VIII, fig. 7.

Lycosa exasperans EMERTON, 1921, Psyche, XXVIII, p. 167.

The specimens from Saunders Island, on the west coast of Greenland, taken by members of the Crocker Land Expedition of 1917 and mentioned by Emerton in the above publication, are not now in the collection of The American Museum of Natural History. However, a male and female from Umanak, Greenland, taken in June, 1914, by Ekblau and Tanquary and labelled *pictilis* by Emerton, is this species. It is a typical *Tarentula* and was compared by Emerton with *pictilis*, *mutabilis* and *poecila*. He says: "it seems probable that comparison of a larger number of specimens would show that all these are one species extending across the Arctic coast from Siberia to Greenland and south through Labrador to the White Mountains." While not admitting that the names enumerated above are synonyms, I believe it quite probable that Siberian forms will be found in northern Canada and that some of the species already described from America occur in Siberia. *Tarentula albostrata* Grube is closely allied to *exasperans*.

Tarentula kochi Keyserling

Tarentula kochii KEYSERLING, 1876, Verh. Zool.-Bot., Gesell., Wien, XXVI, p. 636, Pl. I, fig. 18 (nec *Lycosa kochii* Emerton).

Lycosa bruneiventris BANKS, 1894, Journal New York Entomological Society, II, p. 50.

Lycosa kochi CHAMBERLIN, 1908, Proc. Acad. Nat. Sci. Philadelphia, p. 263, Pl. XXI, figs. 4 and 5.

Pardosa heretica CHAMBERLIN, 1925, Proc. California Academy Sciences, (4) XIV, pp. 125-126, Fig. 37.

Tarentula kochi is the commonest larger Lycosid found in the spring months in the Rocky Mountain region. It has been reported from the Eastern States but this may be an error. Some of these records probably refer to *aculeata* which is common in Minnesota and the northern Mississippi basin.

Tarentula pictilis (Emerton)

Lycosa pictilis EMERTON, 1885, Trans. Connecticut Academy Arts and Sciences, VI, p. 485, Pl. XLVI, fig. 5.

Lycosa pictilis CHAMBERLIN, 1908, Proc. Acad. Nat. Sci. Philadelphia, p. 270, Pl. XIX, figs. 6 and 8.

DISTRIBUTION.—“*L. pictilis* is found on the Mt. Washington range above trees up to the highest summits, on the coast of Labrador and on the arctic coast of Canada.” (Emerton, 1921, Psyche, XXVIII, page 167.)

RECORDS.—Bernard Harbor, 1915. Mouth of Coppermine River, N. W. T., June 16, 1925 (Hoare). Hudson Bay, Great Whale River to Richmond Gulf, August, 1920 (Johansen). Barter Islands, Alaska.

Tarentula mutabilis Kulczynski

Tarentula mutabilis KULCZYNSKI, 1908, Memoires de l'Academie Imperiale des Sciences de St.-Petersbourg, (8) XVIII, No. 7, p. 85, Tab. III, figs. 96-101.

RECORDS.—Colville River, Alaska, 1909 (Anderson) (immature female). Flaxman's Island, Alaska, 1909 (Anderson) (female).

PARDOSA C. Koch

GENOTYPE.—*P. striatipes* C. Koch.

In the following consideration of this genus various nomenclatorial changes are proposed. Many names are regarded as synonyms of described forms, some have been placed in different relationships, and a few, previously synonymized, have been considered as good species. *Pardosa ontariensis* Gertsch was based on a male of *P. coloradensis* Banks, which latter name had been synonymized with *P. sternalis* (Thorell) in 1908. The presence of two additional Palearctic species in

the Nearctic fauna is of considerable interest. It seems worth while at this time to give locality data on some of the American members of the genus and report several species, originally described from Mexico, that are found in the southwestern states. *Pardosa retrorsa* Banks is probably a *Schizocosa*. *Pardosa heretica* Chamberlin is a *Tarentula*.

***Pardosa tesquorum* (Odenwall)**

Lycosa tesquorum ODENWALL, 1901, Öfversigt af Finska Vetenskaps-Societetens Forhandlingar, XLIII, p. 4, Figs. 5 and 6.

Pardosa albiceps EMERTON, 1915, Trans. Connecticut Acad. Arts and Sciences, XX, pp. 153-154, Pl. III, fig. 5.

RECORDS.—James Bay, Moose and Albany Rivers, July, 1920 (Johansen). Awene, Manitoba, September 24, 1917 (Criddle). Mondike Valley, Dawson Rock Creek. Spray River, B.C., July 4, 1914 (Sanson). Medicine Hat, Alberta, September. Yellowstone National Park, Wyoming, August, 1932 (W. E. Gertsch). Panguitch, Utah (Ivie).

***Pardosa metlakatla* Emerton**

Pardosa metlakatla EMERTON, 1917, Canadian Entomologist, XLIX, p. 268, Fig. 20 (3 and 4).

Pardosa hesperella CHAMBERLIN, 1919, Pomona College Journal of Entomology and Zoölogy, XII, p. 16, Pl. VI, fig. 4.

RECORDS.—This species has been recorded from British Columbia in Canada and from Montana in the United States.

***Pardosa coloradensis* Banks**

Pardosa coloradensis BANKS, 1894, Journal New York Entomological Society, II, p. 51 (female).

Pardosa sternalis CHAMBERLIN, 1908, Proc. Acad. Nat. Sci. Philadelphia, p. 185, Pl. VIII, figs. 7 and 9, Pl. XIII, figs. 5 and 6. (Part.)

Pardosa ontariensis GERTSCH, 1933, American Museum Novitates, No. 636, p. 18, Fig. 27 (male).

Males and females taken together in Utah and Wyoming by Mr. Wilton Ivie show that the female described by Banks as *coloradensis* goes with the male *ontariensis*. The females of the species were regarded by Chamberlin in 1908 as representing an immature form of the common western *Pardosa sternalis* (Thorell).

***Pardosa andersoni*, new species**

FEMALE.—Total length, 6.00 mm. Carapace 3.00 mm. long, 2.33 mm. wide. Abdomen 3.13 mm. long, 2.00 mm. wide.

Cephalothorax and legs covered with short appressed hairs, the clypeus with long slender spines. Carapace dark brown, medially with a narrow lighter stripe that goes

forward to the last eye row, the margins with a broader, light submarginal stripe and a dark marginal band. Sternum and labium dark brown, the endites and coxae lighter. Legs dark brown, the femora with black streaks above. Abdomen dark brown, the sides with indistinct black markings.

First row of eyes narrower than the second (20/32), slightly procurved, the medians separated by a diameter, half as far from the subequal laterals. Clypeus twice as high as the diameter of an anterior median eye. Second row of eyes narrower than the third (32/42), scarcely a diameter apart, one and one-half diameters from the smaller eyes of the third row.

Tibia and patella I, 2.90 mm.

Tibia and patella IV, 3.60 mm.

Spines under the tibiae, 2-2-2.

The epigynum is a heavily sclerotized, dark reddish-brown plate as broad as long, narrowed in front to about half the width and medially indented at that point, the caudal margin truncate. The plate is imperforate on the surface, the atribursal orifices being located at each side of the caudal margin, the position indicated by a darker chromatism. The epigynum of *andersoni* closely resembles that organ in various European species but is not identical with any with which it has been compared (e.g., *Pardosa saltuaria*, *blanda*, *monticola*, *agrestis*, *torrentum*, *mizta*, and *tarsalis*). It can scarcely be confused with *hyperborea* Thorell, which is also European, or with *californica* Keyserling, the only American species possessing this type of epigynum. In both these species the openings are on the sides. *P. hyperborea* is considerably smaller and has very broad, marginal lighter stripes on the carapace. The median light stripe in *californica* is very broad and the legs are irregularly maculate in black.

TYPE LOCALITY.—Female holotype from Flaxman's Island, Alaska, July 18–August 6, 1909 (R. M. Anderson) and a female paratype from Colville River, Alaska, 1908, collected by the same individual.

***Pardosa wyuta*, new name**

Pardosa atra BANKS, 1894, Journal New York Entomological Society, II, p. 52.

Nec *Pardosa (Lycosa) atra* GIEBEL, 1869, Zeitschrift für die Gesamten Naturwissenschaften, XXXIV, p. 305.

RECORDS.—Salt Lake City, Utah, April to September, males and females (Gertsch). Zion National Park, July 5, 1932 (Gertsch). Montpelier, Idaho, August 17, 1931 (Gertsch).

***Pardosa giebeli* (Pavesi)**

Lycosa giebeli PAVESI, 1873, Atti della Societa Italiana di Scienze Naturali, XVI, pp. 30 and 31.

Pardosa uncatata EMERTON, 1894, Trans. Connecticut Academy Arts and Sciences, IX, p. 425 (part), Pl. III, figs. 8c, 8d, and 8f.

Pardosa uintana GERTSCH, 1933, American Museum Novitates, No. 636, pp. 27 and 28.

DISTRIBUTION.—Switzerland. Austria. Siberia. Canada. Rocky Mountains: Wyoming, Idaho, Colorado and Utah.

RECORDS.—Cokeville, Wyoming, July 10, 1930 (Gertsch). Uinta Mountains, Utah, August (Gertsch). Kettle Rapids, Manitoba, July 15, 1917. Edmonton, Alberta, July.

***Pardosa modica* (Blackwall)**

Lycosa modica BLACKWALL, 1846, Annals and Magazine, Natural History, London, XVII, p. 33.

Pardosa brunnea EMERTON, 1885, Trans. Connecticut Academy Arts and Sciences, VI, p. 495, Pl. XLVIII, fig. 4.

RECORDS.—Minneapolis, Minnesota, May 10, 1932 (Gertsch). Pelham Bay, New York, March 20, 1921. Fish Lake, Sevier County, Utah, June 23, 1930 (Gertsch).

***Pardosa glacialis* (Thorell)**

Lycosa glacialis THORELL, 1872, Ofvers. K. Vet. Akad. Forh., XXIX, p. 159.

Lycosa aquilonaris L. KOCH, 1874, 'Zweite Deutsche Nordpolarfahrt,' II, p. 400, Pl. I, figs. 1 and 2.

Simon's synonymizing of *aquilonaris* with Thorell's species should be regarded with some suspicion, for subsequent work in that complex of forms has shown that most of them are distinct.

RECORD.—Manitoba.

***Pardosa groenlandica* (Thorell)**

Lycosa groenlandica THORELL, 1872, Ofvers. K. Vet. Akad. Forh., XXIX, p. 157.

Lycosa saccata BLACKWALL, 1846, Annals and Magazine Natural History, London, XVII, p. 34 (not *saccata* Linnaeus).

***Pardosa concinna* (Thorell)**

Lycosa concinna THORELL, 1877, Bulletin U. S. Geological Survey, III, p. 506.

Pardosa glacialis EMERTON, 1894, Trans. Connecticut Academy Arts and Sciences, IX, page 424 (part) Pl. IV, fig. 21.

Pardosa musicola EMERTON, 1911, idem, XVI, p. 401, Pl. V, figs. 2, 2a and 2b.

RECORDS.—Essex County, New York, July 28, 1917 (Notman). Kahtadin Summit, New Hampshire (Britcher). Seven Islands, Labrador, July 20, 1924 (Waugh). Nain, Labrador, July 3, 1922 (Waugh). Ward, Colorado, July 18, 1908 (Lutz). Sevier County, Utah, July 13, 1931 (Gertsch). Alaska, male (no further data).

The following four species are closely related in most respects, the principal differences being in the genitalia and in the relative leg lengths. They may be regarded as varietal forms of *Pardosa lapidicina* Emerton,

as was done by Chamberlin in 1908, but they are listed as distinct species in this paper. *Pardosa sabulosa* Banks has diverged sufficiently from the others to deserve specific rank. Cotypes of *Pardosa sierra*, *medialis* and *sabulosa*, all of Banks, in the collection of the Museum of Comparative Zoölogy are all identical, but the original descriptions and figures seem to indicate that the types, which are now destroyed, represented distinct species. *P. atromedia* Banks is a synonym of *sierra*.

***Pardosa lapidicina* Emerton**

Pardosa lapidicina EMERTON, 1885, Trans. Connecticut Academy Arts and Sciences, VI, p. 494, Pl. XLVIII, figs. 5 to 5e.

DISTRIBUTION.—Eastern United States.

***Pardosa mercurialis* Montgomery**

Pardosa mercurialis MONTGOMERY, 1904, Proc. Acad. Nat. Sci. Philadelphia, p. 270, Pl. XIX, figs. 20 and 21.

Pardosa texana BANKS, 1904, Journal New York Entomological Society, XII, p. 115, Pl. v, fig. 4.

Pardosa lapidicina CHAMBERLIN, 1908, Proc. Acad. Nat. Sci. Philadelphia, p. 195, Pl. XIV, figs. 7 and 8 (part).

This name deserves to be maintained apart from *lapidicina*, *sensu strictu*, as either a species or a variety by virtue of the longer legs and slight differences in the genitalia. As here defined, it included most of the records of *lapidicina* that have been cited from Texas to California. An allied species, described as *atromedia* by Banks, has undoubtedly been confused with it to some extent in west coast records.

***Pardosa sabulosa* Banks**

Pardosa sabulosa BANKS, 1898, Proc. California Academy of Sciences, I, p. 273, Pl. XVI, fig. 28.

RECORDS.—Pedregales, Mexico, August, 1909 (Petrunkévitch). Jemez Springs, New Mexico, June 12–18, 1925 (Dietz).

***Pardosa sierra* Banks**

Pardosa sierra BANKS, 1898, Proc. California Academy of Sciences, (3) I, p. 274, Pl. XVI, fig. 20.

Pardosa medialis BANKS, 1898, idem, p. 273, Pl. XVI, fig. 29 (paratypes, not types).

Pardosa sabulosa BANKS, 1898, idem, p. 273, Pl. XVI, fig. 28 (paratypes, not types).

Pardosa atromedia BANKS, 1904, idem (3) III, p. 355, Pl. XXXIX, fig. 32.

I have seen specimens of this species from New Mexico, California, and Mexico. *Pardosa unquifera* Cambridge is closely related to and perhaps identical with *sierra*.

***Pardosa moesta* Banks**

Pardosa moesta BANKS, 1892, Proc. Acad. Nat. Sci. Philadelphia, p. 70, Pl. III, fig. 44.

RECORDS.—Minneapolis, Minnesota, May, 1930 (Gertsch). Itasca Park, Minnesota, May 29–30, 1932 (Gertsch). Yellowstone National Park, Wyoming, August, 1931 (W. E. Gertsch). Nounan, Bear Lake County, Idaho, August, 1932 (Gertsch).

***Pardosa uncatula* Cambridge**

Pardosa uncatula F. CAMBRIDGE, 1902, 'Biologia Centrali-Americana,' Araneidea, II, p. 320, Pl. XXI, figs. 1 and 2.

Pardosa pauxilla MONTGOMERY, 1904, Proc. Acad. Nat. Sci. Philadelphia, p. 268, Pl. XIX, figs. 22 and 23.

DISTRIBUTION.—Mexico. Texas.

***Pardosa delicata*, new species**

FEMALE.—Total length, 4.50 mm. Carapace 2.40 mm. long, 1.85 mm. wide. Abdomen 2.25 mm. long, 1.50 mm. wide.

Cephalothorax evenly clothed with appressed black hairs, the area of the eyes with black spines and additional ones on the midline. Carapace dusky, the eye area black, medially with a very broad yellow band and the margins with a black seam. Mouth parts, sternum, coxae and legs dirty yellow, provided with black hairs, the legs with long black spines. Dorsum of the abdomen with a median hastate figure poorly indicated, otherwise yellow to brown, the venter light.

Eyes of the first row narrower than the second (21/34), the medians separated by scarcely a diameter, half as far from the smaller laterals. Clypeus twice as high as the diameter of an anterior lateral eye, armed with four submarginal black spines. Second row shorter than the third (34/42), the eyes scarcely a diameter apart, a little farther from the third row, the eyes of which are separated by nearly three diameters.

Tibia and patella I, 2.50 mm.

Tibia and patella IV, 3.00 mm.

Spines beneath the tibiae, 2–2–2.

Epigynum reddish brown, covered with white pubescence. Guide poorly developed anteriorly, consisting of a narrow neck, which enlarges caudally into a spatulate plate, longer than broad, through which the atriobursal openings on each side are clearly visible. In the characters of the epigynum and in color markings the species resembles *P. uncatula* Cambridge, *portoricensis* Banks, *floridana* Banks and other species, the principal difference being that the caudal portion of the guide is longer than it is broad.

MALE.—A representative of this sex lacks the legs and the abdomen, but seems to agree specifically with the female. The color markings of the carapace are much brighter and the light bands are invaded by dark spots. The palpus is all black, clothed with black hairs, the scopus a slender, sinuous spur resembling that of *Pardosa saxatilis* (Hentz), the spine at the base very small.

TYPE LOCALITY.—Female holotype, female paratype, and male allotype from La Zacualpa, Chiapas, Mexico, August, 1909 (Petrunkévitch).

***Pardosa bellona* Banks**

Pardosa bellona BANKS, 1898, Proc. California Academy of Sciences, (1) I, p. 275, Pl. XVI, fig. 21.

RECORDS.—Scottsdale, Arizona, January 13, 1903 (Britcher).
Monroe Canyon, Sevier County, Utah, August 20, 1930 (Gertsch).

***Pardosa floridana* Banks**

Pardosa littoralis BANKS, 1896, Journal New York Entomological Society, IV, p. 192 (*littoralis* preoccupied).

Pardosa floridana BANKS, 1904, Proc. Acad. Nat. Sci. Philadelphia, p. 136, Pl. VII, fig. 1, Pl. VIII, fig. 15.

Pardosa banksi CHAMBERLIN, 1904, Canadian Entomologist, XXXVI, p. 175.

***Pardosa petrunkevitchi*, new species**

MALE.—Total length, 4.25 mm. Carapace 2.32 mm. long, 1.70 mm. wide. Abdomen 1.92 mm. long, 1.40 mm. wide.

Cephalothorax evenly covered with inconspicuous gray hairs. Area of the eyes shining black, the carapace dark brown, except for a median, longitudinal light band that begins behind the third eye row, is as wide as the interval between these eyes, and gradually narrows to the caudal margin. Pars thoracica with a weakly indicated, narrow, submarginal light band, the marginal dark band being quite as wide. Sternum, mouth parts and coxae yellow, sparsely clothed with black hairs. Legs yellow to light brown, the last two pairs with light yellowish hairs. First legs modified, the femur clothed with white hairs, the tibia slightly incrassate, somewhat darker brown in color, provided on all surfaces with a thick growth of long white hairs. Palpus dark brown. Dorsum of the abdomen with a median yellowish zone which encloses a gray, hastate marking; sides darker, the venter light.

First row of eyes narrower than the second (17/24), slightly procurved, the medians separated by two-thirds of a diameter, half as far from the smaller laterals. Clypeus one and one-half times as wide as the diameter of an anterior lateral eye. Second row of eyes separated by a diameter, scarcely one and one-half times as far from the smaller eyes of the third row, which are three diameters apart.

Tibia and patella I, 2.00 mm.

Tibia and patella IV, 2.40 mm.

Spines under the tibiae, 2-2-2, the prolateral row of the first pair lacking the distal one and the others reduced in size.

Palpus with a covering of black hairs. The bulbal apophyses resemble those of *longirulva* Cambridge and to a lesser extent *falcifera* Cambridge. The scopus is a heavy apophysis, provided with the customary stout curved spur at the base, the remainder a long heavy tube that is straight throughout its length, rounded at the end and directed in an anterolateral direction. The embolus is a stout black spine that curves beneath the superior scopal element.

TYPE LOCALITY.—Male holotype from Tonalá, Chiapas, Mexico, collected in August, 1909, by Prof. A. Petrunkevitch.

It is not unusual to have members of this genus in which the pubescence on the legs is conspicuous, especially in some of the boreal species. No other American *Pardosa* with which I am familiar has the first legs so strikingly modified as this new form. The long white hair on the tibia is not matched in any of the numerous forms that are otherwise closely related, e.g. *Pardosa prolifica*, *longivulva*, *bellona*, etc.

***Pardosa prolifica* F. Cambridge**

Pardosa prolifica F. CAMBRIDGE, 1902, 'Biologica Centrali-Americana,' Araneidea, II, p. 317, Pl. xxx, figs. 19 and 20.

RECORDS.—Scottsdale, Arizona, January 17, 1903 (Britcher).

***Pardosa falcifera* F. Cambridge**

Pardosa falcifera F. CAMBRIDGE, 1902, 'Biologica Centrali-Americana,' Araneidea, II, p. 318, Pl. xxx, figs. 23 and 24.

Pardosa orthodox CHAMBERLIN, 1924, Proc. California Academy Sciences, (4) XII, p. 671, Fig. 114.

DISTRIBUTION.—Lower California. Mexico. Southwestern United States.

RECORDS.—Tucson, Arizona, July 3–5, 1916. Scottsdale, Arizona, January 17, 1903 (Britcher). Zion National Park, Utah, July 5, 1931 (Gertsch). Hurricane, Utah, July 7, 1931 (Gertsch and Johnson). Salt Lake City, Utah, August, 1931 (Gertsch).

***Pardosa saxatilis* (Hentz)**

Lycosa saxatilis HENTZ, 1844, Journal Boston Soc. Natural History, IV, p. 392, Pl. xviii, figs. 9 and 10.

Pardosa atlantica EMERTON, 1913, Bulletin American Museum Natural History, XXXII, p. 258, Pl. XLVIII, fig. 7.

RECORD.—Marysvale Canyon, Sevier County, Utah, May 26, 1930, female (Gertsch).

***Pardosa mulaiki*, new species**

MALE.—Total length, 3.75 mm. Carapace 2.00 mm. long, 1.45 mm. wide. Abdomen 1.85 mm. long, 1.10 mm. wide.

Cephalothorax with short, black, inconspicuous hairs, the margins with white hairs, the eye region and clypeus with black spines. Carapace black, medially with a faintly marked longitudinal lighter streak that, anteriorly, scarcely passes the median suture, the margins with an inconspicuous light submarginal band that is obliterated before it reaches the head portion. Sternum black, the endites and labium dusky, the

coxae yellowish below. Legs dusky yellow, the basal leg joints and the femora maculate above in black. Palpus all black except the patella, which is light and apparently once clothed with white hairs as in *saxatilis* Hentz. Dorsum of abdomen nearly black, the venter somewhat paler.

Eyes of the first row narrower than the second (16/23), slightly procurved, the medians a diameter apart, half as far from the somewhat smaller laterals. Clypeus twice as high as the diameter of an anterior lateral eye. Second row of eyes narrower than the third (23/40), about a diameter apart, one and one-third diameters from the smaller eyes of the third row, which are more than three diameters apart.

Tibia and patella I, 1.75 mm.

Tibia and patella IV, 2.15 mm.

Spines beneath the tibiae, 2-2-2.

The palpus is clothed with black hairs and a few stout spines. The affinities of the species are clearly with *saxatilis*, *milvina*, and related species. The scopus furnishes the distinguishing characters. It is considerably shorter than in the first-named species. It is heavy basally and provided at that point with a sharp spine, the principal element directed anterolaterad, gently rounded and ending in a sharp point. In *milvina* the principal part is directed anteriorly and is broadly rounded or elbowed near the end, the distal part pointing laterad. The embolus is a fine tube that terminates near the distal end of the scopus, near which point is a black spur on the bulb.

TYPE LOCALITY.—Male holotype from Edinburgh, Texas, collected by Mr. Stanley Mulaik.

***Pardosa sternalis* (Thorell)**

Lycosa sternalis THORELL, 1877, Bulletin U. S. Geological Survey, III, p. 504.

Lysosa ramulosa MCCOOK, 1893, 'American Spiders,' III, Pl. xxx, figs. 5 and 6. (No verbal description).

Pardosa futilis BANKS, 1898, Proc. California Academy Sciences, (3), p. 274, Pl. xvi, fig. 23 (male cotype, not type).

Pardosa peninsulana BANKS, 1898, idem, p. 275, Pl. xvi, fig. 22.

Pardosa vancouveri EMERTON, 1917, Canadian Entomologist, XLIX, p. 269, Fig. 20.

This is undoubtedly the commonest western *Pardosa* and is found up to 10,000 feet or more in the Rocky Mountains. Specimens named *Lycosa ramulosa* by McCook in the Academy of Natural Sciences of Philadelphia are this species and, though they are not marked as types, probably represent his original material.

***Pardosa distincta* (Blackwall)**

Lycosa distincta BLACKWALL, 1846, Annals and Magazine Natural History, London, XVII, p. 32.

Pardosa pallida EMERTON, 1885, Trans. Connecticut Academy Arts and Sciences, VI, p. 496, Pl. XLIX, fig. 3. (Preoccupied name.)

Pardosa emertoni CHAMBERLIN, 1904, Canadian Entomologist, XXXVI, p. 175.

Pardosa utahensis CHAMBERLIN, 1919, Annals Entomological Society of America, XII, p. 258, Pl. xix, fig. 11.

RECORDS.—Minneapolis, Minnesota, June, 1931 (Gertsch). Boulder, Colorado, July 7, 1908 (Lutz). Cascade, Colorado, July 16, 1914 (Fisk). Estes Park, Colorado, July 5, 1913 (Lutz). Sevier County, Utah, July 13, 1930 (Gertsch). Beaver Creek, Utah, August 5, 1931 (Gertsch). Crow Creek, Idaho, August 4 (Gertsch). St. Charles Canyon, Idaho, July 8, 1931 (Gertsch). Yellowstone National Park, Wyoming.

***Pardosa hyperborea* (Thorell)**

Lycosa hyperborea THORELL, 1869, 'Remarks on Synonyms of European Spiders,' p. 293.

Pardosa luteola EMERTON, 1894, Trans. Connecticut Academy Arts and Sciences, IX, p. 427, Pl. III, fig. 7.

Pardosa distincta CHAMBERLIN, 1908, Proc. Acad. Nat. Sci. Philadelphia, p. 192, Pl. xv, figs. 8 and 9 (not *distincta* Blackwall).

RECORDS.—Seven Islands, Quebec, July 6, 1929 (Waugh). Kettle Rapids, Manitoba, July 15, 1917. Maine (Britcher).

***Pardosa yavapa* Chamberlin**

Pardosa yavapa CHAMBERLIN, 1925, Bulletin Museum of Comparative Zoölogy, LXVIII, pp. 231-232.

Pardosa sanuiana CHAMBERLIN, 1928, Canadian Entomologist, LX, pp. 94-95.

RECORDS.—Meeker, Colorado, July 29, 1909 (Lutz). Estes Park, Colorado, August 8, 1913 (Lutz). Weber Canyon, Utah, May 16, 1931 (Rowe). Henry Mountains, Utah. Richfield, Utah, July, 1930 (Gertsch). Fish Lake, Weber County, July, 1930 (Gertsch). Mud Springs, Pine Canyon, Santa Catalina Mountains, Arizona, July 17, 1916 (Lutz). Flagstaff, Arizona (Peterson).

***Pardosa montgomeryi*, new species**

MALE.—Total length, 4.25 mm. Carapace 2.07 mm. long, 1.50 mm. wide. Abdomen 2.10 mm. long, 1.12 mm. wide.

Cephalothorax clothed with a very sparse covering of black hairs. Carapace with a median longitudinal light band that gradually broadens until at its anterior end it is nearly as broad as the third eye row, the eye quadrangle black. Sides with broad submarginal light bands, the darker intervals or stripes not much wider than the median or marginal bands. Sternum, mouth parts, and endites light, concolorous with the legs, which are unmarked except for the dark femora. Abdomen dark on the sides, medially with a poorly marked lighter hastate maculation, the venter light.

First row of eyes narrower than the second (17/28), slightly procurved, the medians separated by a diameter, less than half as far from the equal laterals. Cly-

peus about three times as high as the diameter of an anterior median eye. Second row of eyes narrower than the third ($27/32$), a diameter apart, half again as far from the smaller eyes of the third row, which are separated by three diameters.

Tibia and patella I, 1.82 mm.

Tibia and patella IV, 2.50 mm.

Spines under the tibiae, 2-2-2.

Palpus black, clothed with black hairs. The species is closely related to *P. yavapa* Chamberlin and *P. distincta* (Blackwall), the principal difference being in the median apophysis of the bulb. This process is moderately stout, strongly bent near the base as in no other described species, elongate, the truncate distal end resting at the retrolateral cymbial margin. A short spine is present near the base of the apophysis as in *P. sternalis* (Thorell). The embolus is a fine tube, hidden by the scopal element. In *P. yavapa* the scopus is a long process, evenly rounded, and usually acutely ended, never bent at the base.

TYPE LOCALITY.—Male holotype from Edinburg, Texas, collected by Mr. Stanley Mulaik.

